Flying Wing Advanced Logistics Delivery System

Logistics Enabler for Distributed Forces

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Paper previously presented at ASNE Joint Seabasing Conference 27-28 January 2005

Outline

- Introduction
- Advanced Logistics Delivery Syste
  - I. Glider / Inflatable Wings
  - II. Launch Ship
  - III. Linear Induction Motor
- Summary & Conclusions

ALDS Team

-**Geoff Hope**, *UK MoD Exchange Officer* - **Team Leader**

-**Rabih Khoury**, *Penn State* – **Structures, Manufacturing**

-**Travis Smith**, *Va Tech* - **Aerodynamics, Operations & Ship Design**

-**Andrew Fowler**, *Worcester Polytech* - **Aerodynamics**

-**Nathan Good**, *Va Tech* - **Ship Design**

-**Ashley Nisewonger**, *Va Tech* - **Ship Design**

-**John Silliman**, *Univ. of Md* - **Seaplanes**

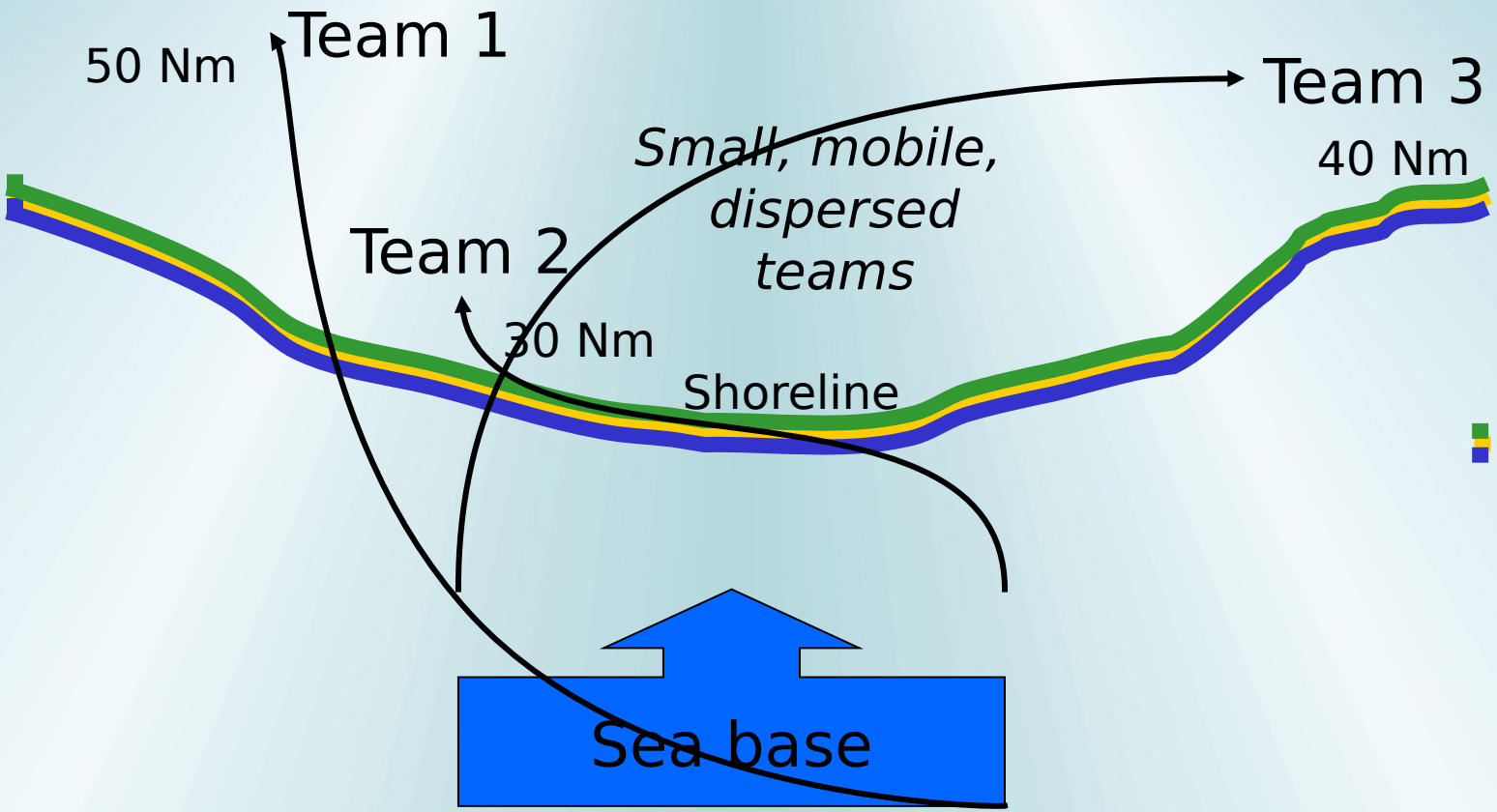
-**Jeff Gembicki**, *Univ. of Md* - **Launch Mechanism**

-**Brandon Small**, *Univ. of Md* - **CAD modeling**

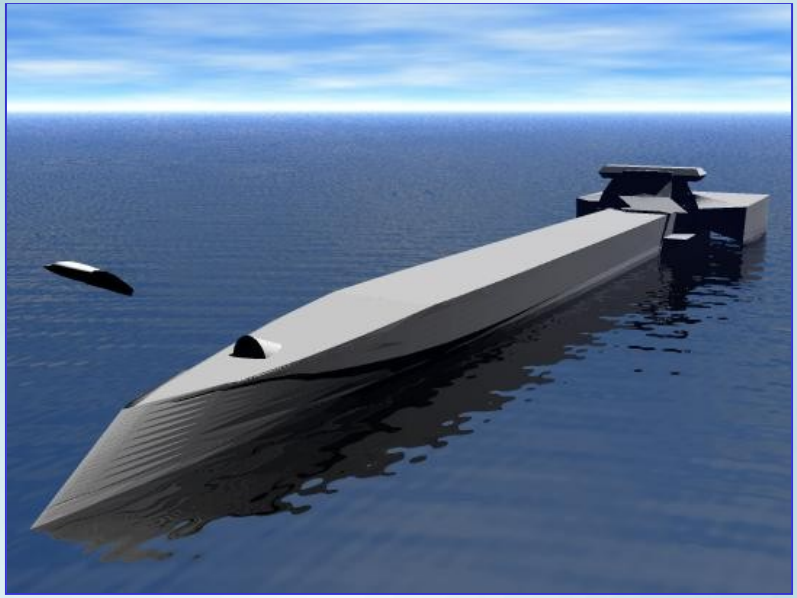
Office of Naval Research

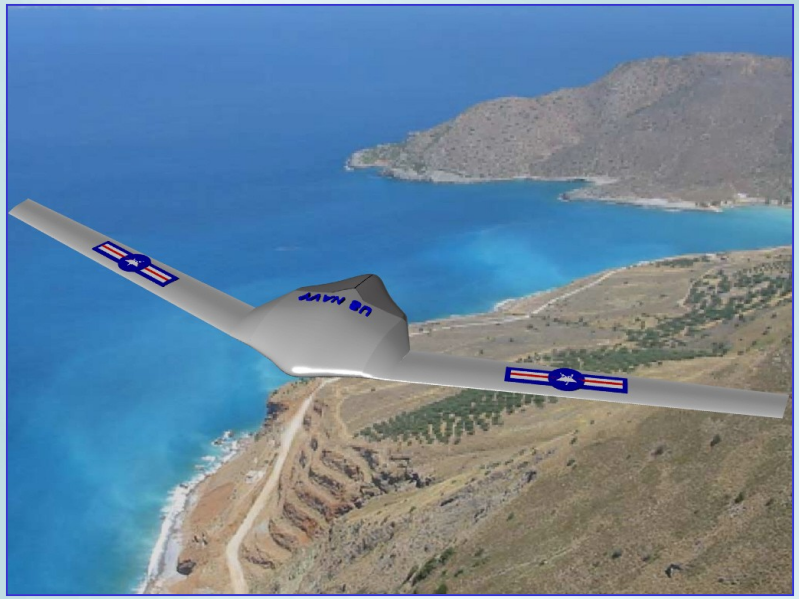
NAVSEA WARFARE CENTERS

ogistics Requirement ~ 75 tons/day (dry cargo



Advanced Logistics Delivery System





- Launch speed = 500 knots
- Required acceleration = 30g
- On-board assembly
- V-22 “Lilly pad”
- Payload = 1,000 lbs
- Basic Range = 50 miles
  - Rocket Augmented ~160 m

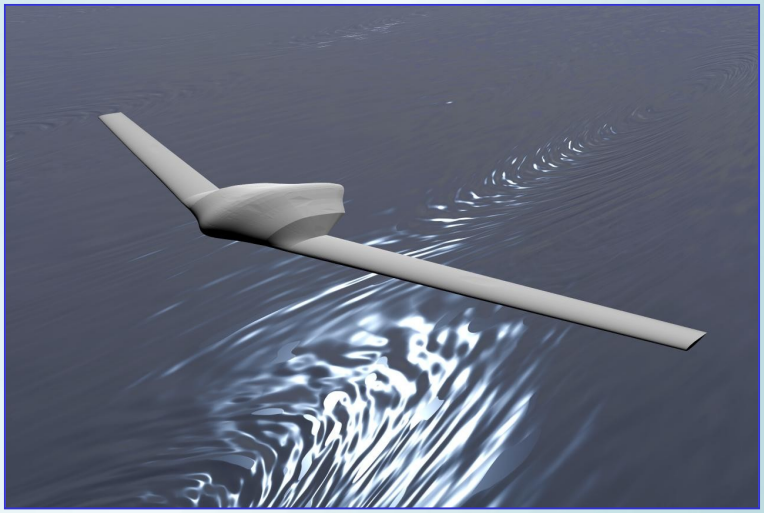
ALDS Animation

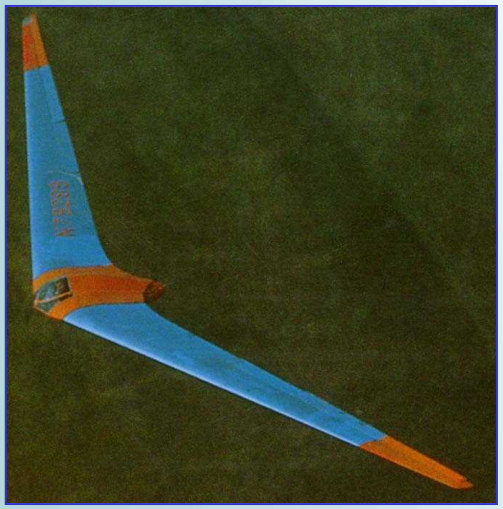
Part I
Unmanned Glider / Inflatable Wing Technology

Tailless Aircraft & Flying Wings

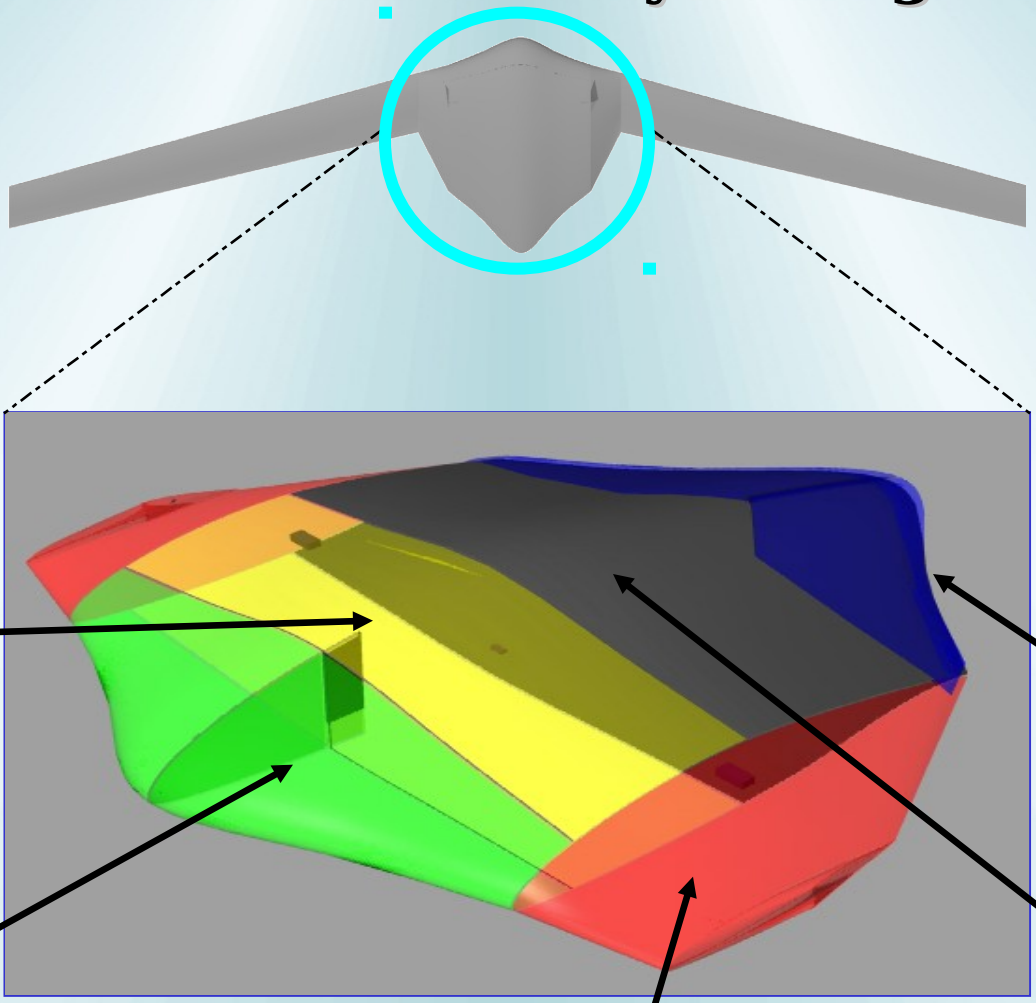
Advantages of Flying Wings

- Increased Performance
- Easier to Assemble
- Less Structure

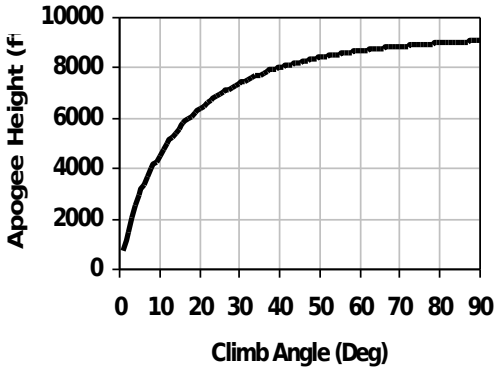


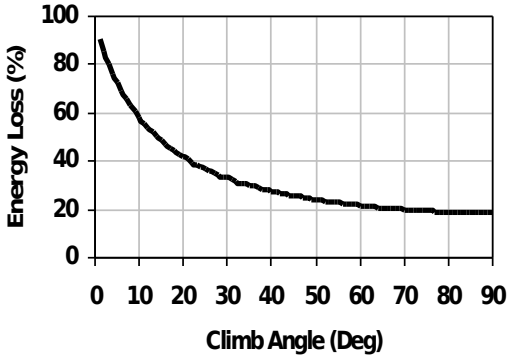


ALDS Centerbody Configuration

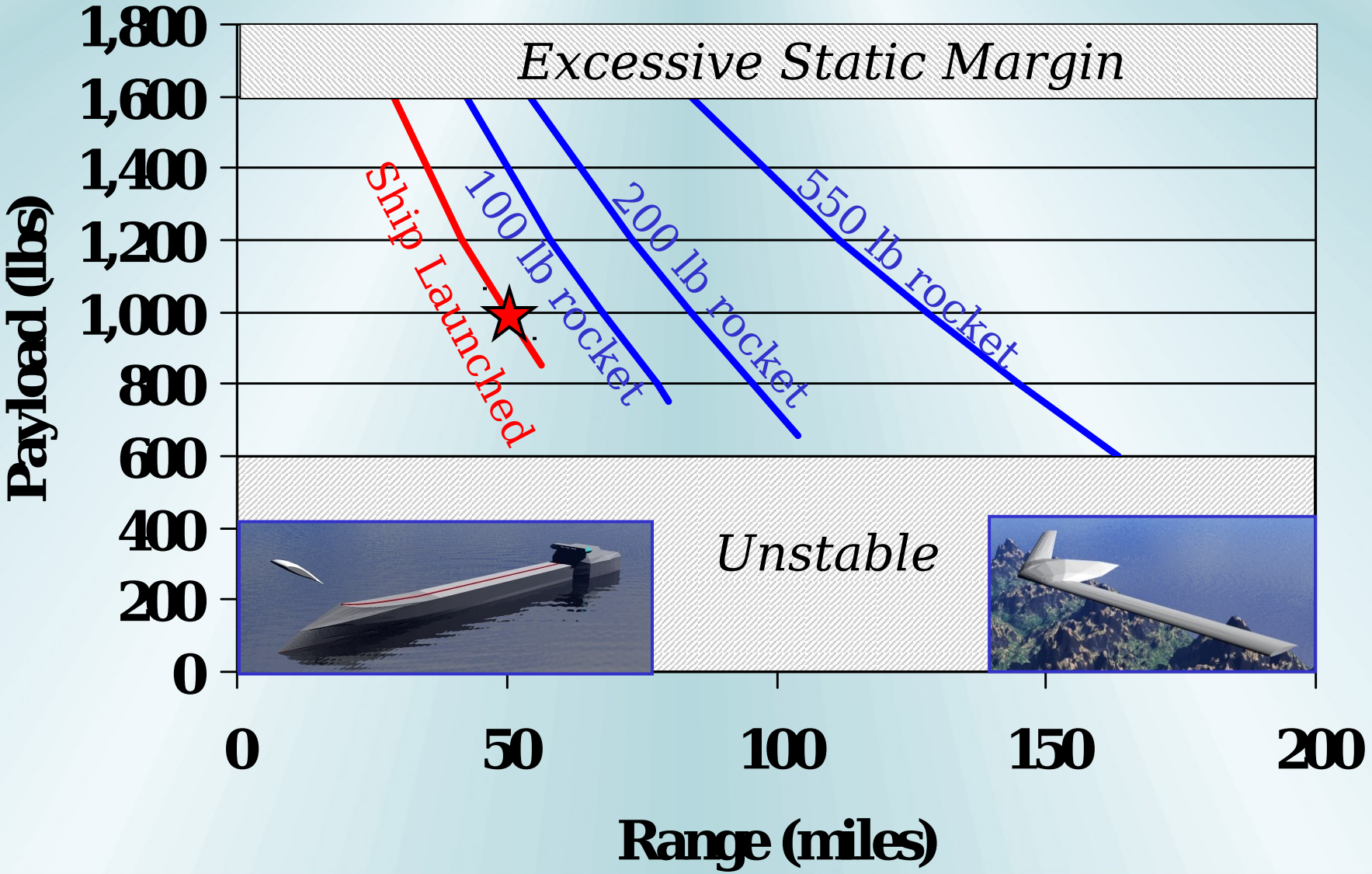


Range (miles)
60
50
40
30
20
10
0
0 10 20 30 40 50 60 70 80 90
Climb Angle (Deg)


Apogee Height (f
10000
8000
6000
4000
2000
0
0 10 20 30 40 50 60 70 80 90
Climb Angle (Deg)

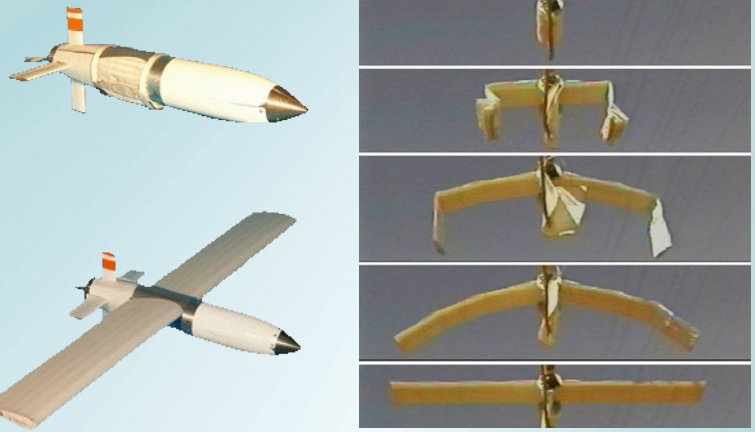

Energy Loss (%)
100
80
60
40
20
0
0 10 20 30 40 50 60 70 80 90
Climb Angle (Deg)

Performance



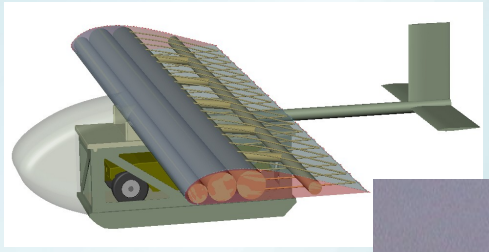
Inflatable Wing Technolog

- Reduces space requirement on board
- Wings not subjected to launch forces



Gun Launched Observation Vehicle

VERTIGO INC.



Extended Range Aerial Delivery System (ERADS)

NASA Inflatable Wing Technology Demonstrator

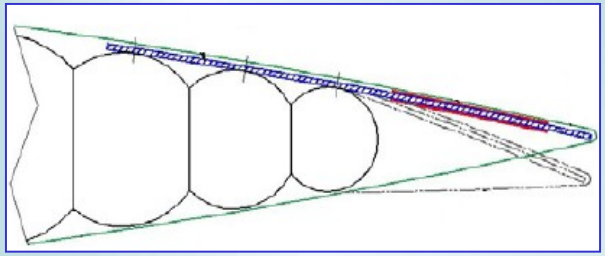
Control Options

Control Surfaces

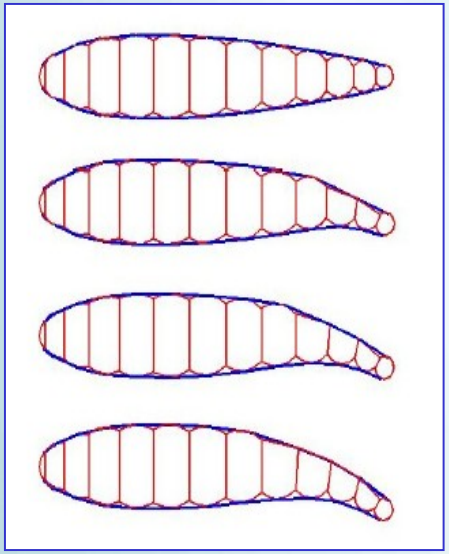
Wing Warping

Wright Flyer

Wing Morphing

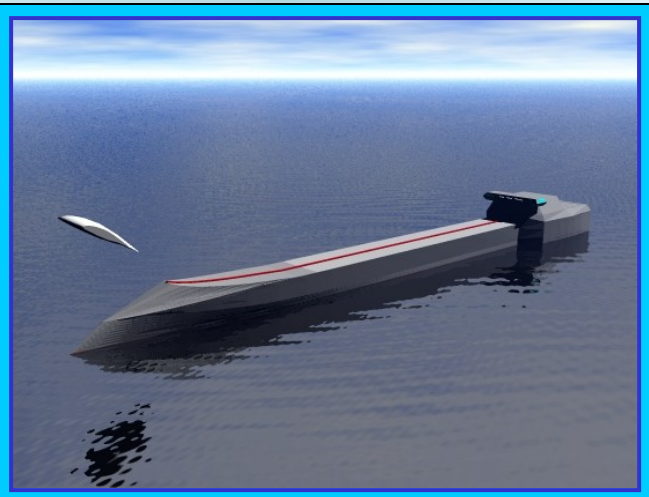


Trailing Edge Deflection



Bump Flattening

Part II
Trimaran Launch Ship



SEA BASE

230 nm

4 days

250 nm

20 nm

30 nm

50 nm

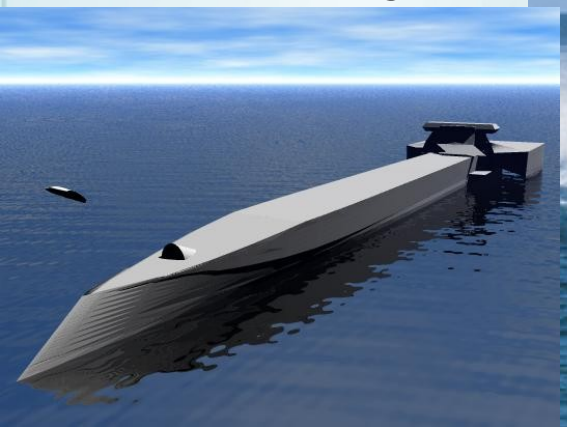
MEB (6,800 troops ashore)

Ship nati

Monohull

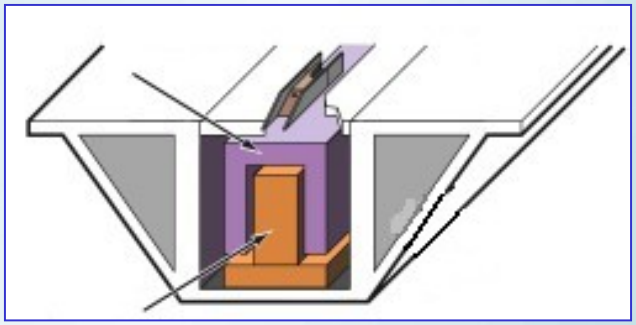
Catamaran

Trimaran



Part III
Linear Induction Motor

Electromagnetic Aircraft Launch System (EMALS)



- Aircraft Mass : 10,000 to 100,000 lbs
- Speeds: 50 to 200 knots
- Min time 2s, max accn: 5g

ALDS Launcher Animation

Summary

- Logistics requirement
- Advanced Logistics Delivery System concept
  - Unmanned glider/inflatable wings
  - Launch ship
  - Linear Induction Motor
- S&T requirements
  - Inflatable wing technology
  - Linear Induction Motors – Carderock Study
  - Onboard assembly / cargo handling
  - University studies

Conclusions

- ALDS could be an vital asset to Sea Base logistics
- Some technology development is required for optimal capability
  - Glider design
  - Inflatable wings
  - Linear induction motor

Center for Innovation in Ship Design

Knowledge People Innovation